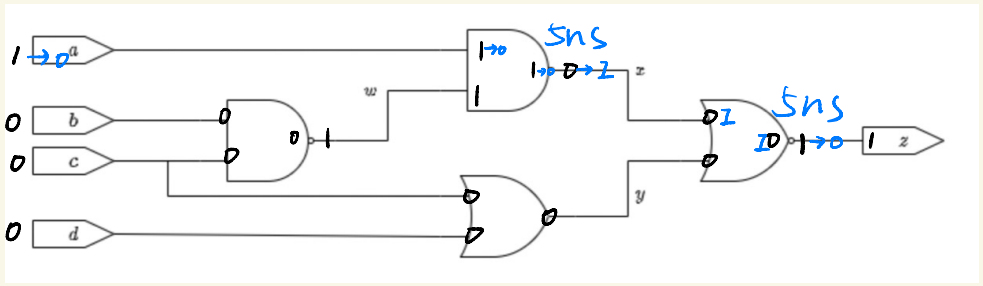
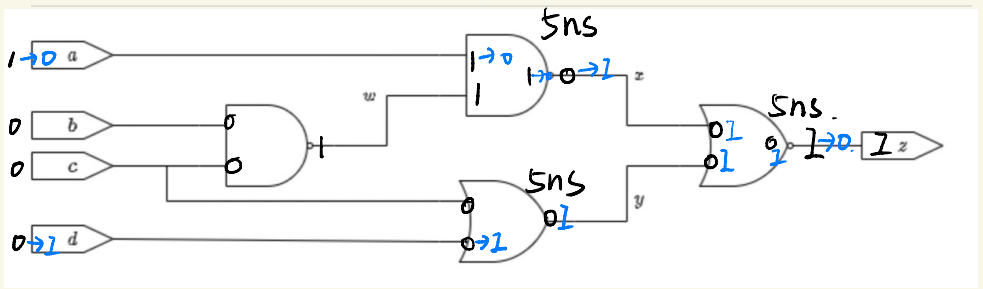


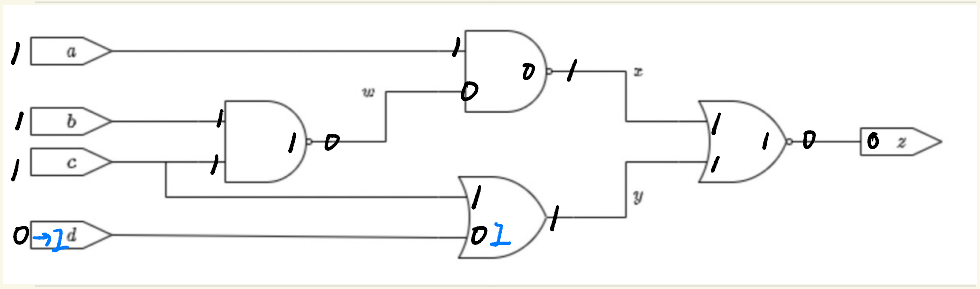
2. What is the maximum delay from the inputs to z for the circuit in figure 1 with all gate delays 5ns and the a, b, c and d inputs have been the following values 1,0,0,0 respectively for a long, long time. Then after 10ns, the values become 0,0,0,0 respectively.

5ns+5ns =10ns



3. What is the maximum delay from the inputs to z for the circuit in figure 1 with all gate delays 5ns and the a, b, c and d inputs have been the following values 1,0,0,0 respectively for a long, long time. Then after 10ns, the values become 0,0,0,1 respectively.

5ns+5ns = 10ns



4. What is the maximum delay from the inputs to z for the circuit in figure 1 with all gate delays 5ns and the a, b, c and d inputs have been the following values 1,1,1,0 respectively for a long, long time. Then after 10ns, the values become 1,1,1,1 respectively.

No change 0

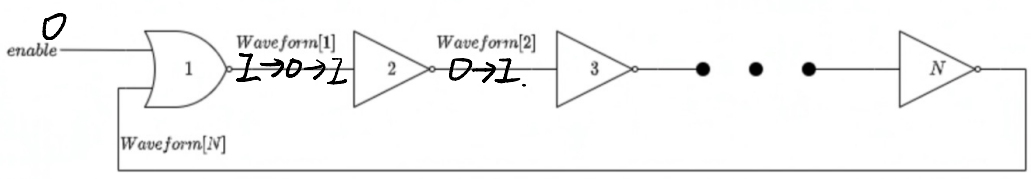


Figure 2: *N*-stage ring oscillator circuit

5. Assuming enable is always 0, give an expression for the oscillation period of the circuit in Figure 2 as a function of N, notDELAY and norDELAY.

the number of "not" is n-1. the one periode has (n-1)tpHL and (n-1)tpLH and we only have 1 nor

The Oscillation period = [norDELAY + (n-1)notDELAY] x 2